REMARKS

Drawing Objection

With regards to the drawing objection Applicants submit herewith, for approval, a proposed additional drawing illustrating Figures 1a-1c. These three figures illustrate the embodiments encompassed within Figure 1. Figure 1a illustrates an embodiment in which treatment zone 7 is positioned between the fractionation column 1 and the hydrotreatment zone 5. This illustrated embodiment does not include a sweetening zone 12. Figure 1b, on the other hand, illustrates embodiment in which there is no treatment zone 7 between the fractionation column and the hydrotreatment zone 5, but there is a sweetening zone 12. Finally, Figure 1c illustrates an embodiment which contains both a treatment zone 7 and sweetening zone 12.

In the objection, it is argued that a catalytic bed, a support and a treatment zone 7 located after the hydrotreatment zone 5 are not shown in the drawings. Firstly, the Examiner is correct that the drawings do not show treatment zone 7 located after hydrotreatment zone 5. This is a result of a typographical error presented at page 13 in the specification and in claims 10 and 14. This typographical error has been corrected. Treatment zone 7, when present, is located before the hydrotreatment zone 5 as shown in Figure 1 and as discussed in other portions of Applicants' specification. As for catalytic bed and support, as shown in the figures, zones 7, 5, 12 and 15 contain a bed. This is indicated in the drawings by the zone containing a "x". This is a conventional depiction of bed material in process drawings and is suitable for illustrating both a "catalytic bed" and a bed in which a catalytic metal is provided on a support.

Also the drawings are objected to with respect to allegedly failing to show the selective diene hydrogenation zone and the mild hydrotreatment zone recited in claims 11 and 15. The mild hydrotreatment zone is hydrotreatment zone 5 which is clearly illustrated in the drawings. Further, the selective diene hydrogenation zone is represented by zone 7 in the drawings.

In view of the above, withdrawal of the drawing objections is respectfully requested.

Objection to the Abstract

Pursuant to the Examiner's request, Applicants have deleted the prior Abstract and submitted a new Abstract which does not use the terms "comprising" or "said."

Amendments

In the above amendments, claims 10, 14 and 17 have been cancelled. Independent claim 18 and additional dependent claims 19-24 have been added. Claims 11 and 12 have been amended to be dependent upon claim 18. Claim 16 has been amended to be depended upon claim 11. In addition, claims 11, 12, 15 and 16 have been amended to use language in accordance with conventional U.S. practice. New claims 19-24 supported throughout the disclosure. See, for example, page 2, lines 13-17; page 4, lines 7-9; page 4, lines 17-23; and page 5, lines 18-28.

New claim 18 replaces prior independent claim 10. Support for claim 18 is found throughout the disclosure. See, e.g., Figures 1 and 2 and the discussion thereof.

Claim Objection

Claim 16 is objected to as being a substantial duplicate of claim 12. By the above amendments, claim 12 is made to be dependent upon claim 18 while claim 16 is made to be dependent upon claim 11. Thus, it is respectfully submitted that claim 16 is not a substantial duplicate of claim 12. Withdrawal of the objection is respectfully requested.

Objection to Claims 10-11 and 15-17

By the above amendments, the language of claims 10-17 has been modified to use language in accordance with conventional U.S. practice and provide express antecedent basis for terms used. It is respectfully submitted that the language of claims 10-17 is sufficiently clear. Withdrawal of the objection is respectfully requested.

Rejection Under 35 U.S.C. §112, Second Paragraph

Claims 10-17 are rejected under §112, second paragraph, as allegedly being indefinite. This rejection is respectfully traversed.

As noted above, the claims have been amended to use language in accordance with

conventional U.S. practice. It is respectfully submitted that the claims as amended provide antecedent basis for features recited therein. Applicants also amended the claims to expressly indicate communication among various parts of the apparatus.

In view of the above remarks, it is respectfully submitted that one of ordinary skill in the art can readily understand the language set forth in Applicants' claims and the scope thereof. Withdrawal of the rejection under 35 U.S.C. §112, second paragraph, is respectfully requested.

Rejection Under 35 U.S.C. §103

Claims 10-17 are rejected as allegedly being obvious in view of Louie et al. (U.S. '242) in combination with Frame et al. (U.S. '525) and Bricker (U.S. '175). This rejection is respectfully traversed.

The process described in U.S. '242 is a hydrotreatment process in which a petroleum distillate feed stock is first split via fractionation to provide at least two different boiling point fractions. One of the fractions is the top distillate stream which has a low sulphur content (e.g., a 350/575°F fraction) and the other is a lower distillate stream which has a relatively concentrated sulphur content (e.g., a 575/700°F fraction). The process utilizes two hydrotreatment zones, each of which contains a catalyst. In the first hydrotreatment zone, the top distillate stream from the fractionation step is subjected to hydrotreatment with an excess of hydrogen to obtain a first effluent. In the second hydrotreatment zone, the lower distillate stream, in admixture with excess hydrogen, is subjected to hydrotreatment to produce a second effluent. See column 3, lines 9-26.

The two hydrotreatment zones can operate under different reaction conditions such as different pressures, see, e.g., column 3, lines 26-33. In addition, rather than having two separate hydrotreatment zones, a single hydrotreatment zone can be used wherein the two feeds sent to the single hydrotreatment zone are alternated. See, e.g., column 3, lines 33-37 and the embodiment of Figure 2 which is discussed at column 6, line 62 - column 7, line 47.

As shown in Figure 1, the effluents from the first and second hydrotreatment zones are individually delivered to separate gas/liquid separators and then passed to separate strippers to remove residual H_2S and other light gases. See column 6, lines 37-40.

In example 2 of U.S. '242, the feedstream contains 1.55% S. The feed is split into two streams. One stream is a -575°F fraction containing 1.1% S and represents 68% of the feed. The second stream is a +575°F fraction containing 1.7% S and represents 32% of the feed. After hydrotreatment, the S contents of the first and second fractions are 0.002 and 0.16, respectively. In example 3, the same feed is used. The first fraction (84% of feed) contains 1.1% S and the second fraction (16% of feed) contains 2.2% S. After hydrotreatment, the S contents of the first and second fractions are 0.07 and 0.29, respectively.

As acknowledged in the Office Action, U.S. '242 is silent with respect to the disclosure of any sweetening zone. In particular, there is no disclosure or suggestion concerning a sweetening zone upstream of a hydrotreatment zone or downstream of a stripping zone. U.S. '242 is silently with regards to a selective diene hydrogenation zone. In particular, U.S. '242 provides no disclosure or suggestion of a selective diene hydrogenation zone between a fractionation column and a hydrotreatment zone.

Frame et al. (U.S. '525) describe a process for sweetening a sour hydrocarbon fraction having a boiling point of about 40°- 350°C. The process comprises two steps which can be conducted in any order. In one step, the sour hydrocarbon fraction is subjected to selective hydrogenolysis in the presence of hydrogen and a selective hydrogenolysis catalyst whereby mercaptans (especially tertiary mercaptans) are selectively hydrogenolysed without hydrogenolysing or hydrogenating other components. In the other step, mercaptans within a sour hydrocarbon fraction are reacted with an oxidizing agent in the presence of a basic component and an oxidation catalyst. In this step, the primary and secondary mercaptans are oxidized to form disulfides.

As noted, the two steps can be carried out in any order. U.S. '525 indicates that it is preferable to perform the selective hydrogenolysis before performing the oxidation step. See column 2, lines 23-38, column 10, lines 47-64.

In the rejection, reference is made to the disclosure at column 2, lines 3-21 of U.S. '525. In this disclosure, U.S. '525 indicates that prior art procedures disclosed hydrotreating and selective hydrogenolysis. However, U.S. '525 characterizes these prior art disclosures as not showing a hydrogenolysis step followed by an oxidation step. U.S. '525 does not refer to a process comprising hydrotreating, selective hydrogenolysis, and

oxidation of mercaptans.

In example 1, the feed used is kerosene containing 413 ppm mercaptans. The feed is not subjected to hydrogenolysis or is subjected to one or two hydrogenolysis steps, and then is subjected to oxidation. The mercaptan content after oxidation was 162 ppm (no hydrogenolysis), 110 ppm (one hydrogenolysis) of 55 ppm (two hydrogenolysis). Examples 2-5 use feeds containing 737 ppm mercaptans, 737 ppm mercaptans, 581 ppm mercaptans, and 773 ppm mercpatans. In these examples hydrogenolysis is also performed first, followed by oxidation.

Bricker (U.S. '175) describes a process for improving the coloring and color stability of a hydrocarbon fraction. In this process, the hydrocarbon fraction is contacted with a selective hydrogenation catalyst in the presence of hydrogen. This is said to result in selective hydrogenation of conjugated unsaturates thereby leading to improve color and color stability. U.S. '175 discloses that the process has two objectives, i.e., to eliminate existing color bodies and to eliminate color body precursors. See, e.g., column 3, lines 38-60. Further, U.S. '175 discloses that its' selective hydrogenation process may be placed into several places within an overall crude refinement process. See column 4, lines 26-31.

In Example III of U.S. '175, a kerosene feed containing 0.26 wt% S is subjected to hydrogenation. The product effluent contains 0.16 wt.% S.

In the rejection it is alleged that it would be obvious to modify the apparatus of Louie et al. to provide both a sweetening zone and a selective hydrogenation zone in light of the teachings of Frame et al. and Bricker et al. However, Louie et al. does not suggest that its process is in need of further treating macaptans. In the examples described in U.S. '242 the sulphur content of the effluent is 20-2900 ppm (0.002-0.29 wt.%). The disclosure of Louie et al. does not suggest modifying its process to take steps to further lower this sulphur content.

Also, it is argued in the rejection that the location of sweetening zones within the process is of no patentable moment in that "shifting location of parts is held to have been obvious." In support of this assertion the rejection cites *In re Japikse*, 86 USPQ7d (CCPA 1950). However, contrary to the assertion in the rejection, *Japikse* does not hold that shifting locations of parts is obvious in all cases.

Firstly, it is noted that *Japikse* does not relate to a chemical process or an apparatus

therefor, but instead relates to a hydraulic power press. Clearly, one of ordinary skill in the art would recognize that shifting parts on a hydraulic power press does not constitute the same amount of work, effort and consideration as does shifting treatment zones within a hydrocarbon treatment process.

Moreover, with regards to the shifting of parts, the Court in *Japikse* was referring to the starting switch on a hydraulic press. Specifically the Court stated:

> As to that limitation it was held that there would be no invention in shifting the starting switch disclosed by Cannon to a different position <u>since the operation of the device would not thereby be modified</u>.
> (Emphasis added)

Thus, in this conclusion, the Court is referring to a particular part of the hydraulic press, i.e., the starting switch, not any part thereof. The court concluded that moving this part from one position to another position did not effect the operation of the device.

However, the present rejection does not discuss why positioning a sweetening zone or selective hydrogenation zone at different locations within the overall process will have no effect on the operation of the system. Clearly, one of ordinary skill in the art would recognize just the opposite, since the feed streams that the sweetening zone will be treating will differ depending upon their locations within the overall process.

Further, is argued in the rejection that it would be obvious to locate the selective hydrogenation zone between the fractionation column and hydrotreatment zone in the apparatus of Louie et al. on grounds that this would eliminate difficulty concerning oxidizing tertiary mercaptans. It is alleged that this concept is taught by Frame et al. and Bricker et al. However, there is no indication in the rejection as to any portion of the disclosure of Frame et al. and/or Bricker et al. that describes the insertion of a selective hydrogenation zone between a fractionation column and a hydrotreatment zone or that such an arrangement would eliminate difficulties concerning oxidizing tertiary mercaptans. Nor is there any indication that the Louie et al. process has difficulties oxidizing tertiary mercaptans. Similarly, there is no indication that the proposed modification of the Louie et al. would eliminate the alleged difficulty of oxidizing tertiary mercaptans.

In any event, none of the prior art references disclose a treatment zone between a fractionation column and a hydrotreatment zone. Similarly, none of the prior art references disclose a sweetening zone after a stripping zone.

It is noted that the feed used in the examples of the Frame et al. process has a sulphur content in the range of 413-737 ppm of S. The sulfur contents of these feedstreams are within the range of the treated lower distillate discharged from the process of Louie et al., as shown in the examples, i.e., 20-700 ppm. Thus, it would seem more likely that one of ordinary skill in the art would add the Frame et al. process at the end of the Louie et al. process, rather than inserting treatment zones within the middle of the Louie et al. process.

In view of the above remarks, it is respectfully submitted that Louie et al., taken alone or in combination with Frame et al and/or Bricker, fail to render obvious Applicants' claimed invention. Withdrawal of the rejection under 35 U.S.C. §103 is respectfully requested.

Information Disclosure Statement

On November 15, 1999, applicants submitted an Information Disclosure Statement. Applicants respectfully request that the Examiner acknowledge consideration of the references cited in the Information Disclosure Statement by initialing the form PTO-1449 and returning an initialed copy of the form to applicants.

Respectfully submitted,

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Filed: December 13, 2002

VERSION WITH MARKINGS TO SHOW CHANGES

IN THE SPECIFICATION:

On page 12, the last paragraph, delete the entire paragraph and replace it with the following paragraph:

a treatment zone (7) located ~~after~~ before the hydrotreatment zone and comprising a line (3) for introducing the light gasoline cut from the fractionation column, an outlet line for the treated light gasoline cut, said zone also comprising at least one catalyst bed containing 0.1-1% of palladium deposited on a support, and said apparatus further comprising a line (13) for taking the stripped and sweetened light gasoline out of the apparatus, and connected either to the zone (9) or to the zone (12) if present.

IN THE CLAIMS:

--**11.** (Amended) An apparatus according to claim 18 ~~10~~, ~~in which the sweetening zone (12) is located after the stripping step and the apparatus~~ further comprising ~~comprises~~ a selective diene hydrogenation zone located between said ~~the~~ fractionation column and said ~~the mild~~ hydrotreatment zone, said hydrogenation zone comprising a gasoline inlet line in fluid communication with said first discharge line (3) for introducing a first gasoline cut, ~~the light cut~~ and ~~an outlet line for the~~ a dedienized first gasoline ~~light~~ cut outlet line.

12. (Twice Amended) An apparatus according to claim 18 ~~10~~, ~~also~~ further comprising a hydrotreating zone (15) for hydrotreating a second gasoline cut, ~~the heavy fraction, provided with a~~ said hydrotreating zone having a gasoline cut inlet line ~~(4)~~ which is in fluid communication with said second discharge line (4) for introducing a second gasoline cut ~~the heavy cut~~ from ~~the~~ said fractionation column, a first ~~an outlet line (16) for the~~ hydrotreated cut outlet line (16), and a hydrogen supply line (17) connected to said gasoline cut inlet line (4) or said hydrotreating zone, and ~~supplying hydrogen to the feed or to the zone~~, ~~said zone being followed by~~ a stripping column (18) having ~~provided with~~ a hydrotreated cut inlet line in fluid communication with said first hydrotreated cut outlet

line, ~~for introducing the hydrotreated cut~~, an H_2S outlet line (19), and ~~an~~ a second hydrotreated cut outlet line (20) ~~for the hydrotreated cut~~.

15. An apparatus according to claim 13, ~~in which the sweetening zone (12) is located after the stripping step and the apparatus~~ further comprising ~~comprises~~ a selective diene hydrogenation zone located between said ~~the~~ fractionation column and said ~~the mild~~ hydrotreatment zone, said hydrogenation zone comprising a gasoline inlet line in fluid communication with said first discharge line (3) for introducing a first gasoline cut, ~~the light cut~~ and ~~an outlet line for the~~ a dedienized first gasoline ~~light~~ cut outlet line.

16. An apparatus according to claim 11 ~~10~~, ~~also~~ further comprising a hydrotreating zone (15) for hydrotreating a second gasoline cut, ~~the heavy fraction, provided with a~~ said hydrotreating zone having a gasoline cut inlet line ~~(4)~~ which is in fluid communication with said second discharge line (4) for introducing said second gasoline cut ~~the heavy cut~~ from ~~the~~ said fractionation column, a first ~~an outlet line (16) for the~~ hydrotreated cut outlet line (16), and a hydrogen supply line (17) connected to said gasoline cut inlet line (4) or said hydrotreating zone, and ~~supplying hydrogen to the feed or to the zone~~, ~~said zone being followed by~~ a stripping column (18) having ~~provided with~~ a hydrotreated cut inlet line in fluid communication with said first hydrotreated cut outlet line, ~~for introducing the hydrotreated cut~~, an H_2S outlet line (19), and ~~an~~ a second hydrotreated cut outlet line (20) ~~for the hydrotreated cut~~.